

TO: Director, National Institute for Occupational Safety and Health

FROM: California Fatality Assessment and Control Evaluation (CA/FACE) Program

SUBJECT: A Construction Foreman Dies When the Construction Equipment He was Operating Tipped Over on Him

SUMMARY
California FACE Report #06CA003

A 61-year-old construction foreman died when the tandem-drum vibratory compaction roller he was operating tipped over and crushed him. The compaction roller was a 3.5 ton version that articulated in the middle and came equipped with a roll-over protection structure (ROPS) device over the operator's seat. The victim was operating the roller along an incline next to a roadway when the incident occurred. The incline was approximately 25 degrees. The rear drum of the roller articulated to the left and then the roller slid down the incline and tipped over on its side. The victim jumped off the roller but could not get out of the way in time. The victim was not wearing his seat belt or hard hat at the time of the incident. A security guard at the gate at the bottom of the roadway witnessed the incident and ran to get help. The CA/FACE investigator determined that, in order to prevent future occurrences, employers, as part of their Injury and Illness Prevention Program (IIPP), should:

- Ensure that machines are not operated on grades steeper than those specified by the manufacturer.
- Ensure that employees wear their seat belts when operating heavy equipment outfitted with a ROPS device as well as other personal protective equipment (PPE) as needed.

INTRODUCTION

On April 27, 2006, at approximately 9 a.m., a 61-year-old construction foreman died when the roller he was operating tipped over on its side. The CA/FACE investigator learned of this incident on April 28, 2006, through a fax from the Los Angeles District Office of the Division of Occupational Safety and Health (Cal/OSHA). Contact with the victim's employer was made on May 11, 2006. On May 16, 2006, the CA/FACE investigator traveled to the construction site where the incident occurred and interviewed the company's project engineer who responded to the incident. The area where the incident took place was photographed and examined. The CA/FACE investigator also traveled to the main facility of the construction company and talked with other employees of the company and photographed the 3.5 ton roller involved in the incident.

The employer of the victim was a general engineering contractor specializing in paving projects such as roads, airports, port facilities, and parking lots in both public and private areas. The company had been in business for 28 years and had 200 employees. The company had been working at the construction site where the incident took place for 12 months and was in the last days of finishing the job. The victim had worked for the company for 20 years and had been a competent equipment operator without any major incident during that time as noted by supervisor observation. He had been at the worksite for approximately one week prior to the incident. The number of employees onsite varied from three to 25 over the past 12 months. At the time of the incident, there were three employees onsite.

The company had a written IIPP. The program had all the elements required by state law. The company also had a Site Specific Health and Safety Procedure for the construction site where the incident took place. Safety meetings were held weekly at the construction site and were documented. The company had a training program that provided regular safety training to employees. Specific training was also provided to all employees on jobsites with respect to hazards specific to each employee's job assignment. The training program consisted of mostly on-the-job training. Training was measured by supervisor's observation of job performance. The victim had received all the regular safety training provided by the company. It is unknown if he had specific training for the compaction roller he was operating.

INVESTIGATION

The site of the incident was a construction site on the perimeter of an international airport. The heavy equipment involved in the incident was a 3.5-ton articulating vibratory tandem-drum compaction roller. A vibratory compaction roller compacts surfaces with its weight and vibration. On the day of the incident, the victim was operating the compaction roller on a newly constructed roadway that was formed out of crushed aggregate. The roadway ran in an east/west direction and down an incline where the incident occurred. The north bank of the roadway where the incident occurred angled downward approximately 25 degrees.

The operator was compacting the soil on the north bank of the newly constructed roadway. He was parallel with the roadway heading west when the rear drum on the compaction roller shifted rapidly to the left, causing the roller to start sliding down the incline and start to tip over. The victim jumped off the roller to his left. The compaction roller tipped over and the ROPS landed on the victim. A guard at the bottom of the roadway witnessed the incident and ran to get help from the project engineer. The project engineer called 911 and then went to assist the victim. He checked the victim for vital signs and found none. He waited for the paramedics to arrive and they pronounced the victim dead. The compact roller involved in this incident came equipped with a retractable seat belt that was in working condition at the time of the incident. The victim was not wearing his seat belt when the incident occurred.

CAUSE OF DEATH

The cause of death, according to the death certificate, was blunt head trauma.

RECOMMENDATIONS / DISCUSSION

Recommendation #1: Ensure that machines are not operated on grades steeper than those specified by the manufacturer.

Discussion: Operators need to be aware of the hazards associated with operating machinery on non-level surfaces. The operator's manual for most compaction rollers frequently stipulate that care must be taken to reduce the risk of personal injury or damage to the equipment. They also recommend that machine operation should usually be up or down on slopes rather than from side to side. In order to ensure safe operation and to protect the machine's engine, some compaction rollers are restricted to a slope no greater than 11 degrees or 20 percent grade. Operators should continuously evaluate grades on which machinery is being operated to prevent rollovers. They should also continually evaluate the safety plans to address changing conditions at the worksite. Employers can enhance worker compliance with safe work practices through programs of task specific training, supervision, recognition, and progressive disciplinary measures.

Recommendation #2: Ensure that employees wear their seat belts when operating heavy equipment outfitted with a ROPS device as well as other personal protective equipment (PPE) as needed.

Discussion: The compaction roller involved in this incident came equipped with a roll-over protective structure (ROPS) and a factory installed seat belt. The victim was not wearing his seat belt. Seat belts were designed to hold the operator in place during the normal operation of the equipment. The seat belts were also designed to prevent the operator from slipping or falling out of the seat during abnormal operations. Keeping the operator secured allows him/her to keep the equipment under control during adverse conditions. Failure to use seat belts in conjunction with a ROPS has proven to be hazardous to equipment operators during a rollover. Employees need to be trained to wear the seat belt and not to jump from the equipment in the event of a rollover. They also need to be trained to keep knees and elbows close to the body, hold on firmly, and lean away from the impact to avoid being crushed by the ROPS.

References:

California Code of Regulations, Vol. 9, Title 8, Sections 1590. Haulage and Earth Moving, General, (c) Equipment Control. 1596. Roll-Over Protective Structures (ROPS). 1597. Jobsite Vehicles

Construction Industry Manufacturers Association Vibratory roller handbook with standardized terms and definitions, SECOND EDITION 1994

<http://www.cdc.gov/niosh/docs/wp-solutions/2005-101/pdfs/2005-101.pdf>

<http://www.cdc.gov/niosh/face/In-house/full200020.html>

EXHIBITS:



Exhibit 1. A picture of the articulating vibratory tandem-drum compactor roller involved in the incident.



Exhibit 2. A picture of the rear of the compact roller involved in the incident.



Exhibit 3. A picture of the roadway where the incident took place looking east.



Exhibit 4. A picture of the roadway where the incident took place looking west.

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FATALITY ASSESSMENT AND CONTROL EVALUATION PROGRAM

The California Department of Health Services, in cooperation with the Public Health Institute and the National Institute for Occupational Safety and Health (NIOSH), conducts investigations of work-related fatalities. The goal of this program, known as the California Fatality Assessment and Control Evaluation (CA/FACE), is to prevent fatal work injuries in the future. CA/FACE aims to achieve this goal by studying the work environment, the worker, the task the worker was performing, the tools the worker was using, the energy exchange resulting in fatal injury, and the role of management in controlling how these factors interact. NIOSH-funded, State-based FACE programs include: California, Iowa, Kentucky, Massachusetts, Michigan, New Jersey, New York, Oregon, and Washington.

Additional information regarding the CA/FACE program is available from:

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